

Claims

[c1] What is claimed is:

1. A method of medical image overlap comprising the steps of:

determining at least two anatomical fiducial markers on a functional image;

determining corresponding points to the at least two anatomical fiducial markers on an anatomical image;

aligning the at least two anatomical fiducial markers with the corresponding points on the anatomical image; and

warping the functional image to fit constraints of the anatomical image while maintaining alignment of the at least two anatomical fiducial markers and the corresponding points on the anatomical image.

[c2] 2. The method of claim 1 further comprising the step of accessing a model of functional data prior to determining the at least two anatomical fiducial markers.

[c3] 3. The method of claim 1 wherein the functional image includes perfusion data and the anatomical image includes anatomical data of a coronary artery.

[c4] 4. The method of claim 3 wherein the at least two

anatomical fiducial markers and the corresponding points on the anatomical image correspond to ventricle grooves between ventricles of a medical patient.

- [c5] 5. The method of claim 4 wherein the data acquired with PET and the data acquired with CT include gated images.
- [c6] 6. The method of claim 3 wherein the perfusion data includes data acquired with positron emission tomography (PET) and the anatomical data includes data acquired with computed tomography (CT).
- [c7] 7. The method of claim 3 wherein anatomical constraints of the functional image take into account cardiac motion.
- [c8] 8. The method of claim 1 wherein the step of determining the at least two anatomical fiducial markers includes the step of locating the at least two anatomical fiducial markers in a three-dimensional image.
- [c9] 9. The method of claim 1 wherein the step of aligning includes registering the functional image and the anatomical image by at least one of translating, scaling, and rotating the functional image and the anatomical image with respect to one another.
- [c10] 10. The method of claim 1 further comprising the step of enforcing anatomical constraints during the step of

warping by projecting a nearest point on the functional image onto the anatomical image while maintaining surface smoothness.

- [c11] 11. A diagnostic image generation system comprising:
at least one database containing functional and anatomical image data; and
a computer programmed to:
determine at least a pair of fiducial markers on a functional image;
locate corresponding anatomical indicia on an anatomical image; and
generate a composite image of the functional image and the anatomical image such that the fiducial markers and the anatomical indicia are aligned and anatomical constraints are considered.
- [c12] 12. The system of claim 11 wherein the computer is further programmed to at least one of translate, scale, and rotate the functional image and the anatomical image with respect to one another such that the at least the pair of fiducial markers and the anatomical indicia are cooperatively aligned.
- [c13] 13. The system of claim 11 wherein the functional image corresponds to perfusion data acquired of a patient using PET and the anatomical image corresponds to coro-

nary artery data of the patient acquired using CT.

[c14] 14. The system of claim 13 wherein the functional image data and the anatomical image data include gated data.

[c15] 15. The system of claim 11 wherein the functional image is a 3D approximate model of a patient anatomy.

[c16] 16. The system of claim 11 wherein the computer is further programmed to warp the functional image such that functional image data is fit to anatomical constraints of the anatomical image.

[c17] 17. The system of claim 11 wherein the computer is further programmed to isolate ventricular grooves when determining the at least a pair of fiducial markers.

[c18] 18. A computer readable storage medium having a computer program stored thereon, the computer program representing a set of instructions that when executed by a computer cause the computer to:

- access functional image data of a medical patient;
- access anatomical image data of the medical patient;
- identify more than one fiducial marker in the functional image data;
- identify anatomical locations in the anatomical image data that correspond to the more than one fiducial marker; and

generate an image with the functional image data superimposed on the anatomical image data that considers anatomical constraints.

[c19] 19. The computer readable storage medium of claim 18 wherein the set of instructions further causes the computer to align the more than one fiducial marker with the anatomical locations.

[c20] 20. The computer readable storage medium of claim 19 wherein the set of instructions further causes the computer to warp the functional image data to fit constraints of the anatomical image data.

[c21] 21. The computer readable storage medium of claim 18 wherein the functional data includes positron emission tomographic perfusion data of a coronary region of a medical patient and the anatomical image data includes computed tomographic coronary artery data of the medical patient.

[c22] 22. The computer readable storage medium of claim 18 wherein the functional image data and the anatomical image data are geometrically collocated.